
**Plastics — Determination of dynamic
mechanical properties —**

**Part 2:
Torsion-pendulum method**

*Plastiques — Détermination des propriétés mécaniques dynamiques —
Partie 2: Méthode au pendule de torsion*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6721-2 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 2, *Mechanical properties*.

This second edition cancels and replaces the first edition (ISO 6721-2:1994), of which it constitutes a minor revision. It also incorporates the Technical Corrigendum ISO 6721-2:1994/Cor.1:1995. Apart from the inclusion of the Corrigendum (which concerns the last sentence in the first paragraph in Annex C), the main changes are the updating of the references and the correction of ISO 6721-3 to ISO 6721-1 in Subclause 5.6.

ISO 6721 consists of the following parts, under the general title *Plastics — Determination of dynamic mechanical properties*:

- *Part 1: General principles*
- *Part 2: Torsion-pendulum method*
- *Part 3: Flexural vibration — Resonance-curve method*
- *Part 4: Tensile vibration — Non-resonance method*
- *Part 5: Flexural vibration — Non-resonance method*
- *Part 6: Shear vibration — Non-resonance method*
- *Part 7: Torsional vibration — Non-resonance method*
- *Part 8: Longitudinal and shear vibration — Wave-propagation method*
- *Part 9: Tensile vibration — Sonic-pulse propagation method*
- *Part 10: Complex shear viscosity using a parallel-plate oscillatory rheometer*

Plastics — Determination of dynamic mechanical properties —

Part 2: Torsion-pendulum method

1 Scope

This part of ISO 6721 specifies two methods (A and B) for determining the linear dynamic mechanical properties of plastics, i.e. the storage and loss components of the torsional modulus, as a function of temperature, for small deformations within the frequency range from 0,1 Hz to 10 Hz.

The temperature dependence of these properties, measured over a sufficiently broad range of temperatures (for example from $-50\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$ for the majority of commercially available plastics), gives information on the transition regions (for example the glass transition and the melting transition) of the polymer. It also provides information concerning the onset of plastic flow. The two methods described are not applicable to non-symmetrical laminates (see ISO 6721-3 *Plastics — Determination of dynamic mechanical properties — Part 3: Flexural vibration — Resonance-curve method*). The methods are not suitable for testing rubbers, for which the user is referred to ISO 4664-2, *Rubber, vulcanized or thermoplastic — Determination of dynamic properties — Part 2: Torsion pendulum methods at low frequencies*.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6721-1:2001, *Plastics — Determination of dynamic mechanical properties — Part 1: General principles*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6721-1:2001, Clause 3, apply.

4 Principle

A test specimen of uniform cross-section is gripped by two clamps, one of them fixed and the other connected to a disc, which acts as an inertial member, by a rod. The end of the specimen connected to the disc is excited, together with the disc, to execute freely decaying torsional oscillations. The oscillation mode is that designated IV in ISO 6721-1:2001, Table 2, and the type of modulus is G_{t0} as defined in ISO 6721-1:2001, Table 3.

The inertial member is suspended either from the specimen (method A, see Figure 1) or from a wire (method B, see Figure 2). In the latter case, the wire is also part of the elastically oscillating system.